

WHAT IS CLAIMED IS:

1. A surface acoustic wave device, comprising:  
a piezoelectric substrate; and  
at least two basic sections disposed on said piezoelectric substrate, each of the at least two basic sections including an asymmetrical double electrode defining a half wavelength section and having first and second strips with different widths from each other;

wherein an absolute value of a vector angle of a reflection center obtained from a resultant vector generated by synthesizing reflection vectors at edges of the first and second strips, is within a range of angles of approximately  $45 \pm 10^\circ$  or approximately  $135 \pm 10^\circ$ , when a center of a respective one of said at least two basic sections is a reference position for the range of angles.

2. A surface acoustic wave device according to claim 1, wherein reflection amounts of surface acoustic waves at edge positions of said strips are substantially equal to one another.

3. A surface acoustic wave device according to claim 1, wherein said asymmetrical double electrode is an interdigital transducer.

4. A surface acoustic wave device according to claim 1, wherein said asymmetrical double electrode is a reflector.

5. A surface acoustic wave device according to claim 1, wherein said piezoelectric substrate is made of a quartz crystal material.

6. A surface acoustic wave device, comprising:  
a piezoelectric substrate; and  
at least two basic sections disposed on said piezoelectric substrate, each of the at least two basic sections including an asymmetrical double electrode defining a half wavelength section and having first and second strips with different widths from each other;

wherein an absolute value of a phase difference between an excitation center and an reflection center of said asymmetrical double electrode is within approximately  $45 \pm 10^\circ$  or approximately  $135 \pm 10^\circ$ .

7. A surface acoustic wave device according to claim 6, wherein reflection amounts of surface acoustic waves at edge positions of said strips are substantially equal to one another.

8. A surface acoustic wave device according to claim 6, wherein said asymmetrical double electrode is an interdigital transducer.

9. A surface acoustic wave device according to claim 6, wherein said asymmetrical double electrode is a reflector.

10. A surface acoustic wave device according to claim 6, wherein said piezoelectric substrate is made of a quartz crystal material.

11. A surface acoustic wave device, comprising:  
a piezoelectric substrate; and  
at least two basic sections disposed on said piezoelectric substrate, each of the at least two basic sections including an asymmetrical double electrode defining a half wavelength section and having first and second strips with different widths from each other;

wherein when edge positions of said first and second strips are  $X_1$ ,  $X_2$ ,  $X_3$  and  $X_4$ , each of which is a value corrected using a sonic speed difference between a free surface and a metallic surface, and when a resultant vector length of normalized reflected waves from the edge positions is  $|\Gamma|$ , and a center position of one of said at least two

basic sections is  $0(\lambda)$ , and  $X1 \cong -X4$ , each of the positions of  $X2$  and  $X3$  is substantially equal to a value satisfying the following equations (1) and (2):

$$X2[\lambda] = A \times X1[\lambda]^2 + B \times X1[\lambda] + C \pm 0.1[\lambda] \dots (1)$$

$$X3[\lambda] = D \times X1[\lambda]^2 + E \times X1[\lambda] + F \pm 0.05[\lambda] \dots (2);$$

wherein in the equation (1) and (2), A to F are expressed by the following equations:

$$A = -34.546 \times |\Gamma|^6 + 176.36 \times |\Gamma|^5 - 354.19 \times |\Gamma|^4 + 354.94 \times |\Gamma|^3 - 160.44 \times |\Gamma|^2 + 10.095 \times |\Gamma| - 1.7558$$

$$B = -15.464 \times |\Gamma|^6 + 77.741 \times |\Gamma|^5 - 153.44 \times |\Gamma|^4 + 147.20 \times |\Gamma|^3 - 68.363 \times |\Gamma|^2 + 6.3925 \times |\Gamma| - 1.7498$$

$$C = -1.772 \times |\Gamma|^6 + 8.7879 \times |\Gamma|^5 - 17.07 \times |\Gamma|^4 + 16.092 \times |\Gamma|^3 - 7.4655 \times |\Gamma|^2 + 0.8379 \times |\Gamma| - 0.3318$$

$$D = 12.064 \times |\Gamma|^6 - 45.501 \times |\Gamma|^5 + 57.344 \times |\Gamma|^4 - 22.683 \times |\Gamma|^3 + 12.933 \times |\Gamma|^2 - 15.938 \times |\Gamma| - 0.1815$$

$$E = 7.2106 \times |\Gamma|^6 - 30.023 \times |\Gamma|^5 + 45.792 \times |\Gamma|^4 - 29.784 \times |\Gamma|^3 + 13.125 \times |\Gamma|^2 - 6.3973 \times |\Gamma| + 1.0203$$

$$F = 1.0138 \times |\Gamma|^6 - 4.4422 \times |\Gamma|^5 + 7.3402 \times |\Gamma|^4 - 5.474 \times |\Gamma|^3 + 2.3366 \times |\Gamma|^2 - 0.7540 \times |\Gamma| + 0.2637.$$

12. A surface acoustic wave device according to claim 11, wherein the reflection amounts of surface acoustic waves at the edge positions X1, X2, X3 and X4 of said strips are substantially equal to one another.

13. A surface acoustic wave device according to claim 11, wherein said asymmetrical double electrode is an interdigital transducer.

14. A surface acoustic wave device according to claim 11, wherein said asymmetrical double electrode is a reflector.

15. A surface acoustic wave device according to claim 11, wherein said piezoelectric substrate is made of a quartz crystal material.